

THE
LONDON, EDINBURGH, AND DUBLIN
PHILOSOPHICAL MAGAZINE
AND
JOURNAL OF SCIENCE.

CONDUCTED BY

SIR OLIVER JOSEPH LODGE, D.Sc., LL.D., F.R.S.
SIR JOSEPH JOHN THOMSON, O.M., M.A., Sc.D., LL.D., F.R.S.
JOHN JOLY, M.A., D.Sc., F.R.S., F.G.S.
RICHARD TAUNTON FRANCIS, F.R.S.E.

AND

WILLIAM FRANCIS, F.L.S.

“Nec aranearum sane textus ideo melior quia ex se filia gignunt, nec noster
vilior quia ex alienis libamus ut apes.” JUST. LIPS. *Polit.* lib. i. cap. 1. Not.

VOL. IX.—SEVENTH SERIES.

JANUARY—JUNE 1930.

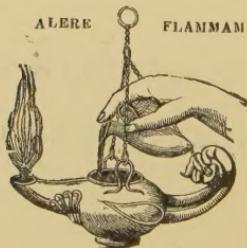
London:

TAYLOR AND FRANCIS, RED LION COURT, FLEET STREET.
SOLD BY SMITH AND SON, GLASGOW;—HODGES, FIGGIS, AND CO., DUBLIN;—
AND VHUVE J. BOYVEAU, PARIS,

“Meditationis est perscrutari occulta ; contemplationis est admirari perspicua Admiratio generat quæstionem, quæstio investigationem investigatio inventionem.”—*Hugo de S. Victore.*

—“Cur spirent venti, cur terra dehiscat,
Cur mare turgescat, pelago cur tantus amaror,
Cur caput obseura Phœbus ferrugine condat,
Quid toties diros cogat flagrare cometas,
Quid pariat nubes, veniant cur fulmina cœlo,
Quo micet igne Iris, superos quis conciat orbes
Tam vario motu.”

J. B. Pinelli ad Mazonium



CONTENTS OF VOL. IX.

(SEVENTH SERIES).

NUMBER LV.—JANUARY 1930.

	Page
Mr. S. Davies and Prof. E. J. Evans on the Damping produced by Eddy Currents induced in Metal Spheres and Cylinders Oscillating in a Non-Uniform Magnetic Field, and its Application to the Determination of Resistivity.....	1
Mr. E. S. Keeping on the Damped Oscillation of a Conductor in a Non-Uniform Magnetic Field	16
Mr. A. E. Bate on the Determination of the End Correction and Conductance at the Mouth of a Stopped Organ (Flue) Pipe	23
Messrs. Edward S. Lamar and W. Edwards Deeming on Temperature Distribution along a Heated Filament used as a Catalyst ..	28
Dr. D. B. Deodhar on New Bands in the Secondary Spectrum of Hydrogen.—Part II.	37
Dr. Ludwik Silberstein on Illuminated Spacetime: Optical Effects of Isotropic Radiation Spread over Elliptic Space	50
Dr. A. Claassen on the Calculation of Absorption in X-Ray Powder-Photographs and the Scattering Power of Tungsten.....	57
Dr. William Hume-Rothery on the Crystal Structures of the Elements of the B Sub-Groups and their Connexion with the Periodic Table and Atomic Structures	65
Mr. Hrishikesh Rakshit on the Distribution of Space Charge between a Plane Hot Cathode and a Parallel Anode.....	80
Messrs. D. Banerji and R. Ganguli on the Generation of Pulses in Vibrating Strings. (Plate I.)	88
Dr. G. F. C. Searle on the Mutual Action of a Pair of Rational Current Elements	92
Dr. A. E. Martin on the Determination of the Variation with Pressure of the Force between Two Plates at Different Temperatures at Low Pressures, with a View to the Determination of Molecular Mean Free Paths.....	97
Mr. F. J. Garrick on Studies in Coordination. Part I.—Ion Hydrates	131
Mr. W. R. Morgans on the Kirchhoff Formula extended to a Moving Surface.....	141
Dr. J. Lockwood Taylor on some Hydrodynamical Inertia Coefficients	161
Prof. Seiichi Higuchi on some Closed Algebraic Curves and their Application to Dynamical Problems.—Part I.	184
Notices respecting New Books:—	
Mr. V. Bush's Operational Circuit Analysis	191
Mr. G. Birtwistle's <i>La Nouvelle Mécanique de Quanta</i>	191
Prof. H. A. Lorentz's <i>Vorlesungen über Theoretische Physik</i> ..	192

	Page
NUMBER LVI.—FEBRUARY.	
Mr. G. W. Brindley on the Amplitude of Vibration of Ions in the Crystals NaCl, NaF, LiF, and KCl	193
Mr. G. W. Brindley on a Note on the Scattering Power of the Carbon Atom in Diamond for X-Rays.....	204
Prof. N. A. Kolossowsky on the Principle of Inaccessibility of the Absolute Zero	208
Mr. Zirô Tuzi on the Effect of a Circular Hole on the Stress Distribution in a Beam under Uniform Bending Moment. (Plate II). .	210
Mr. T. L. Eckersley on The Critical Frequency in an Ionized Medium. Steady Magnetic Force Present.....	225
Prof. T. M. Lowry and Mr. M. A. Vernon on the Electronic Theory of Valency.—Part VII. (Plates III. & IV.).....	233
Dr. George Green on some Problems in the Conduction of Heat ..	241
Prof. W. M. Thornton on the Propagation of Flame in Gaseous Explosions	260
Mr. A. C. Bauerji on the Scattering of α -particles by Light Atoms. .	273
Mr. S. Chandrasekhar on the Ionization-Formula and the New Statistics	292
Dr. S. L. Ziemecki and Mr. K. Narkiewicz-Jodko on the Raman-Effect in the Proximity of the Critical Point.....	299
Dr. Kulesh Chandra Kar and Mr. Mohinimohon Ghosh on the Théory of the Pianoforte String struck by a Hard Hammer.—Part I. .	306
Dr. K. C. Kar and Mr. M. Ghosh on the Theory of the Pianoforte String struck by a Hard Hammer.—Part II. .	321
Mr. Andrew Robertson on the Critical Stress for Tubular Struts ..	324
Proceedings of the Geological Society :—	
Dr. P. K. Ghosh on the Carnmenellis Granite: its Petrology, Metamorphism, and Tectonics	326
Mr. Richard Dixon Oldham on Historic Changes of Level in the Delta of the Rhone.....	327
Major Arthur Richard Dwyerhouse on the Glaciation of Clun Forest, Radnor Forest, and some Adjoining Districts	328

NUMBER LVII.—MARCH.

Mr. Sydney Thomas on Vibrations damped by Solid Friction	329
Dr. Eric J. Irons on the Free Periods of Resonators	346
Mr. R. W. Roberts on the Paramagnetic Rotatory Dispersion of Aqueous Solutions of Cobalt Sulphate in the Visible and Ultra-Violet Regions of the Spectrum	361
Prof. W. T. David and Mr. W. Davies on Luminosity in Gaseous Combustion. (Plates V.-VIII.)	390
Prof. W. T. David and Mr. W. Davies on Temperature Measurements in Gaseous Combustion. (Plate IX.)	402
Prof. J. B. Seth and Messrs. Chetan Anand and Girdhari Lal Puri on some Experiments with Carbon Line Resistances	415
Dr. A. R. Martin on the Effect of a Permanent Electrical Dipole on the Internal Latent Heat of Vaporization of a Liquid	422
Dr. W. H. Brooks on Problems of determining Initial and Maximum Stresses in Ties and Struts under Elastic or Rigid End Constraints.—Part II.....	426

CONTENTS OF VOL. IX.—SEVENTH SERIES.

v

	Page
Dr. A. L. Reimann and Mr. R. Murgoci on Thermionic Emission and Electrical Conductivity of Oxide Cathodes	440
Miss Hazel M. Fletcher on the Effect of Occluded Gases and Moisture on the Resistance of Air Condensers at Radio Frequencies	464
Prof. H. Saegusa and Mr. S. Shimizu on an Anomalous After-Effect of Dielectrics for their Apparent Resistivity	474
Prof. H. Levy and Mr. S. G. Hooker on the Vortex System in the Wake of a Cylinder in a Fluid	489
Mr. F. E. Hoare on the Damping of a Pendulum by Viscous Media (Aniline)	502
Mr. Wilfred W. Barkas on Positive and Negative Photophoresis of Colloidal Particles in Aqueous Solutions	505
Messrs. S. Barratt and A. R. Bonar on the Band Spectra of Cadmium and Bismuth	519
Dr. J. Brentano on Precision Measurement of X-Ray Reflexions from Crystal Powders.....	525

NUMBER LVIII.—APRIL.

Mr. C. Childs on the Cathode Dark Space in the Geissler Discharge	529
Mr. Emlyn Stephens on the Hall Effect, Electrical Conductivity, and Thermoelectric Power of the Lead-Antimony Series of Alloys ..	547
Prof. V. A. Bailey on the Behaviour of Electrons in Magnetic Fields ..	560
Mr. D. Meksyn on Hamilton's Principle and the Field Equations of Radiation	568
Prof. P. E. Shaw on Frictional Electricity	577
Prof. Meghnad Saha and Ramesh Chandra Majumdar on new Methods in Statistical Mechanics	584
Messrs. J. A. C. Teegan and K. G. Krishnan on Application of the Photoelectric Cell to the Measurement of Small Displacements ..	589
Mr. J. P. Andrews on the Theory of Collision of Spheres of Soft Metals	593
Mr. William Stone on some Phenomena of the Contact of Solids ..	610
Mr. S. Chandrasekhar on the Probability Method in the New Statistics	621
Prof. V. A. Bailey on the Behaviour of Electrons in Magnetic Fields ..	625
Prof. P. E. Shaw on the Nature of Friction	628
Mr. P. Cormac on a Skew Double-Slider-Crank Mechanism	639
Mr. Paul White on the Scattering and Diffraction of Cathode-Rays ..	641
Mr. W. G. Penney on Hydrogen and Helium Lines as Standards of Wave-length	661
Prof. A. Ogg on the Space-Group of the Alkaline Sulphates, with a Note by Dr. A. E. H. Tutton	665
Mr. H. Carrington on Critical Stresses for Tubular Struts	668
Notices respecting New Books:—	
Prof. D. E. Smith's Source Books in the History of the Sciences ..	668
Prof. H. W. Turnbull's The Great Mathematicians	669
Mr. F. C. S. Schiller's Logic for Use	669
Messrs. W. Wien and F. Harms's Handbuch der Experimental Physik	670
Mr. F. Bony's Leçons de Mécanique Rationnelle, Tome deuxième ..	671
Proceedings of the Geological Society:—	
Prof. Beeby Thompson on the Upper Estuarine Series of Northamptonshire and Northern Oxfordshire	671

	Page
NUMBER LIX.—MAY (SUPPLEMENT).	
Prof. W. M. Hicks on an Analysis of the Spectrum of Hg II	673
Mr. K. F. Herzfeld on the Scattering of Sound-Waves by small Elastic Spheres.....	741
Mr. K. F. Herzfeld on the Propagation of Sound in Suspensions ..	752
Miss Dorothy A. Newton on the Investigation of the Cataphoresis of small Particles in Water	769
Dr. L. Silberstein and Mr. A. P. H. Trivelli on the Quantum Theory of X-Ray Exposures on Photographic Emulsions. (Plate X.) ..	787
Mr. J. P. Den Hartog on Forced Vibrations with combined Viscous and Coulomb Damping.....	801
Messrs. P. A. Macdonald and John F. Allen on the Psychophysical Law.—I. The Sense of Vision.....	817
Messrs. P. A. Macdonald and John F. Allen on the Psychophysical Law.—II. The Sense of Audition	827
Mr. John F. Allen on the Depression and Enhancement of Auditory Sensitivity	834
Dr. W. N. Bond: Concerning Electrical and other Dimensions ..	842
Dr. F. C. Chalklin on the Soft X-Rays of Manganese	847
Mr. A. F. Dufton on the Effective Temperature of a Warmed Room. (Plate XI.)	858
Notices respecting New Books:—	
Dr. J. W. Mellor's A Comprehensive Treatment on Inorganic and Theoretical Chemistry	861
Dr. H. Banister's Elementary Applications of Statistical Method	862
Prof. R. H. Fowler's The Elementary Differential Geometry of Plane Curves.....	862
Proceedings of the Geological Society:—	
Dr. Edward Greenly on Foliation in its Relation to Folding in the Mona Complex at Rhoscolyn (Anglesey)	863
Dr. Frederick Walker on the Geology of the Shiant Isles ..	864
NUMBER LX.—MAY.	
Mr. S. Whitehead on Dipoles in Relation to the Anomalous Properties of Dielectrics.....	865
Mr. A. G. Warren on the Free and Forced Symmetrical Oscillations of Thin Bars, Circular Diaphragms, and Annuli ..	881
Mr. A. T. Starr on Lag in a Thermometer when the Temperature of the External Medium is Varying.....	901
Mr. G. A. Tomlinson on a Molecular Theory of Elastic Hysteresis.....	913
Prof. Hermann Weyl on Redshift and Relativistic Cosmology ..	936
Dr. Edmund C. Stoner on the Equilibrium of Dense Stars	944
Mr. D. B. Mair on Second Order Expressions for the Potentials of a Sphere.....	964
Dr. E. C. Rhodes on Reducing Observations by the Method of Minimum Deviations	974
Messrs. E. Vyron Howells and W. Morris Jones on an X-ray Investigation of the Copper-Antimony System of Alloys	993
Mr. E. H. Synge on a Method of Investigating the Higher Atmosphere	1014
Dr. F. E. King and Prof. J. R. Partington on Measurements of Sound-Velocities in Air, Oxygen, and Carbon Dioxide at Temperatures from 900° C. to 1200° C., with special reference to the Temperature-Coefficients of Molecular Heats	1020

CONTENTS OF VOL. IX.—SEVENTH SERIES.

vii

	Page
Mr. F. Tyler on the Magnetic Characteristics of Nickel	1026
Drs. N. A. V. Piercy and E. G. Richardson on the Turbulence in front of a Body moving through a Viscous Fluid	1038
Dr. H. Monteagle Barlow on Experiments on the Apparent Deviation from Ohm's Law for Metals at High Current Densities. 1041	
Notices respecting New Books:—	
Dr. Harvey Fletcher's Speech and Hearing	1055
Lady T. Mary Lockyer and Miss Winifred L. Lockyer's The Life and Work of Sir Norman Lockyer	1057
His Majesty's Stationery Office—National Physical Laboratory Collected Researches	1057
Prof. P. Debye's Dipolmoment und Chemische Struktur	1058
Mr. Rudolf Peierls's Einführung in die Wellenmechanik, Louis de Broglie	1058
Proceedings of the Geological Society:—	
Mr. John Vernon Harrison on the Geology of some Salt-Plugs in Laristan (Southern Persia)	1059
Prof. J. W. Gregory on Geological History of the Pacific Ocean	1060
Mr. Sydney Ewart Hollingworth on the Glaciation of Western Edenside and Adjoining Areas, and the Drumlins of Edenside and the Solway Basin	1062
Prof. W. T. Gordon: Exhibition of a set of Cellulose 'Pulls' from Coal-Balls	1063

NUMBER LXI.—JUNE.

Prof. Alfred W. Porter: Notes on Surface-Tension	1065
Dr. Gorakh Prasad on the Numerical Solution of Partial Differential Equations	1074
Mr. G. W. Brindley on the Scattering Powers of the Atoms in Magnesium Oxide for X-Rays and some Related Properties....	1081
Dr. W. H. Brooks on the Problems of determining Initial and Maximum Stresses in Ties and Struts under Elastic or Rigid End Constraints.—Part III.	1094
Mr. E. Tyler on a Hot-Wire Amplifier Method for the Measurement of the Distribution of Vortices behind Obstacles	1113
Dr. R. A. Houston on the Mathematical Representation of Sensibility to Difference of Colour	1130
Prof. J. S. Townsend on the Energies of Electrons in Gases	1145
Dr. R. N. Ghosh on the Elastic Impact of a Pianoforte Hammer. (Plate XII.)	1174
Sir J. J. Thomson on the Relation of Electronic Waves to Light Quanta and to Planck's Law	1185
Notices respecting New Books:—	
Sir Henry A. Miers's An Introduction to the Scientific Study of Minerals. Second Edition, revised by H. L. Bowman ..	1194
Lewis's Catalogue of Medical and Scientific Circulating Library	1196
Proceedings of the Geological Society:—	
Mr. Roy Woodhouse Pocock on the Age of the Midland Basalts	1196
Dr. Thomas Robertson on the Origin of the Etruria Marl....	1197
Mr. Walter Campbell Smith on a Classification of some Rhyolites, Trachytes, and Phonolites from part of Kenya Colony, with a Note on some associated Basaltic Rocks ..	1198
Prof. Léon W. Collet on the Structure of the Canadian Rockies	1199
Index	1200

PLATES.

- I. Illustrative of Messrs. D. Banerji and R. Ganguli's Paper on the Generation of Pulses in Vibrating Strings.
- II. Illustrative of Mr. Z. Tuzi's Paper on the Effect of a Circular Hole on the Stress Distribution in a Beam under Uniform Bending Moment.
- III. & IV. Illustrative of Prof. T. M. Lowry and Mr. A. Vernon's Paper on the Electronic Theory of Valency.
- V.—VIII. Illustrative of Prof. W. T. David and Mr. W. Davies's Paper on Luminosity in Gaseous Combustion.
- IX. Illustrative of Prof. W. T. David and Mr. W. Davies's Paper on Temperature Measurements in Gaseous Combustion.
- X. Illustrative of Dr. L. Silberstein and Mr. A. P. H. Trivelli's Paper on the Quantum Theory of X-Ray Exposures on Photographic Emulsions.
- XI. Illustrative of Mr. A. F. Dufton's Paper on the Effective Temperature of a Warmed Room.
- XII. Illustrative of Dr. R. N. Ghosh's Paper on the Elastic Impact of a Pianoforte Hammer.

ERRATUM.

Vol. VIII., p. 990 (December 1929), line 21,
for 10⁻¹² ampère read 10⁻⁸ ampere.